

GCSE Chemistry (9 – 1)

Balancing Equations

Name:

Group:

Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.



For markers use	
Question	Mark
1	/14
2	/26
3	/26
4	/7
Total	/73
%	
Grade	

Information

- The maximum mark for this paper is 73 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.

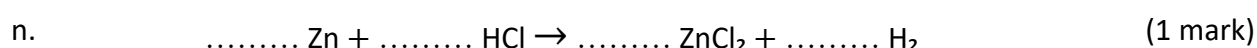
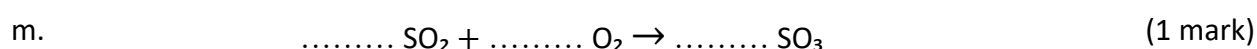
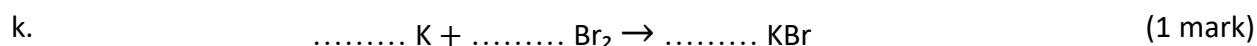
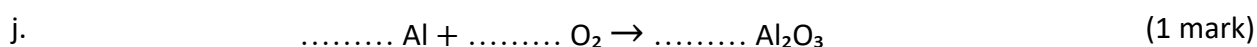
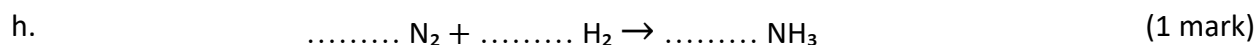
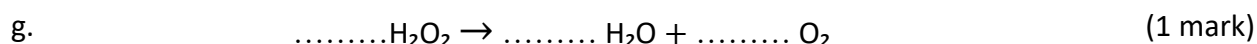
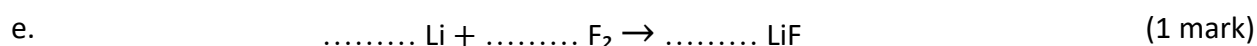
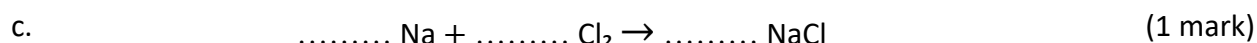
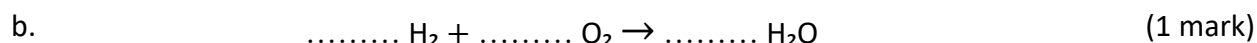
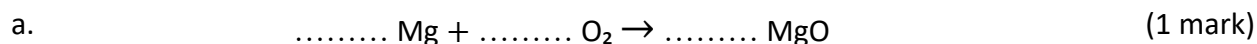


Balancing chemical equations is an absolutely key skill in chemistry. It shows clearly that mass is conserved in a chemical reaction. With this in mind, it's very much a case of practise, practise and more practise.

Let's get into them 😊

Section 1: Introduction To Balancing Equations.

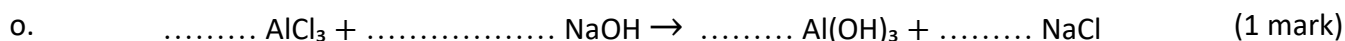
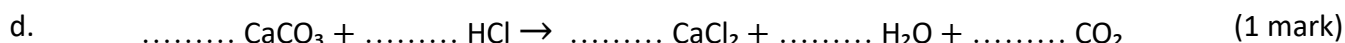
1. Balance the following equations.



Total for Question 1 = 14 marks

Section 2: Moderate Balancing Equations

2. Balance the following equations. Read each carefully before you attempt to balance.



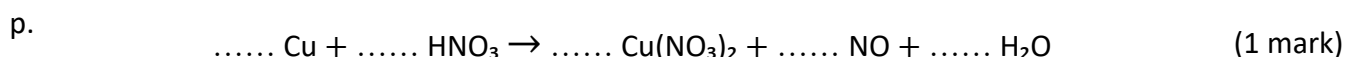
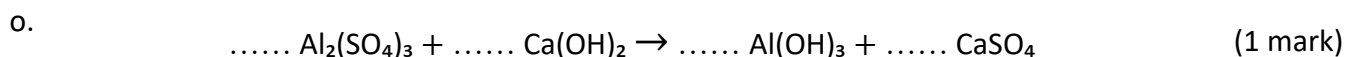
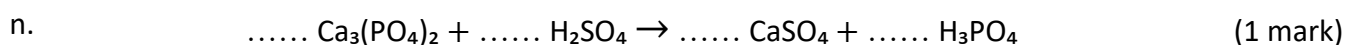
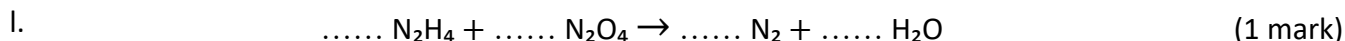
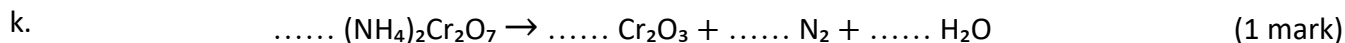
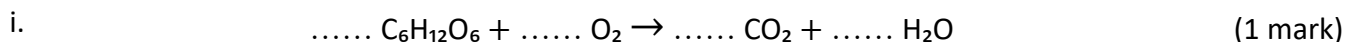
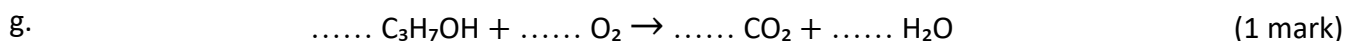
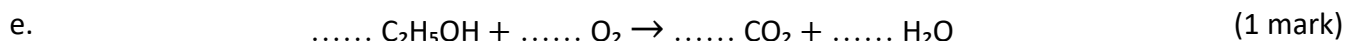
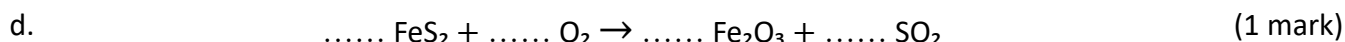
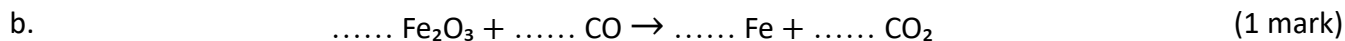
- q. $\dots\dots\dots \text{Fe}_2\text{O}_3 + \dots\dots\dots \text{C} \rightarrow \dots\dots\dots \text{Fe} + \dots\dots\dots \text{CO}$ (1 mark)
- r. $\dots\dots\dots \text{CuO} + \dots\dots\dots \text{NH}_3 \rightarrow \dots\dots\dots \text{Cu} + \dots\dots\dots \text{N}_2 + \dots\dots\dots \text{H}_2\text{O}$ (1 mark)
- s. $\dots\dots\dots \text{P}_4 + \dots\dots\dots \text{O}_2 \rightarrow \dots\dots\dots \text{P}_4\text{O}_{10}$ (1 mark)
- t. $\dots\dots\dots \text{SiCl}_4 + \dots\dots\dots \text{H}_2\text{O} \rightarrow \dots\dots\dots \text{H}_4\text{SiO}_4 + \dots\dots\dots \text{HCl}$ (1 mark)
- u. $\dots\dots\dots \text{NH}_3 + \dots\dots\dots \text{O}_2 \rightarrow \dots\dots\dots \text{NO} + \dots\dots\dots \text{H}_2\text{O}$ (1 mark)
- v. $\dots\dots\dots \text{KClO}_3 \rightarrow \dots\dots\dots \text{KCl} + \dots\dots\dots \text{O}_2$ (1 mark)
- w. $\dots\dots\dots \text{Ca}_3(\text{PO}_4)_2 + \dots\dots\dots \text{SiO}_2 + \dots\dots\dots \text{C} \rightarrow \dots\dots\dots \text{CaSiO}_3 + \dots\dots\dots \text{CO} + \dots\dots\dots \text{P}$ (1 mark)
- x. $\dots\dots\dots \text{FeS}_2 + \dots\dots\dots \text{O}_2 \rightarrow \dots\dots\dots \text{Fe}_2\text{O}_3 + \dots\dots\dots \text{SO}_2$ (1 mark)
- y. $\dots\dots\dots \text{Cu} + \dots\dots\dots \text{HNO}_3 \rightarrow \dots\dots\dots \text{Cu}(\text{NO}_3)_2 + \dots\dots\dots \text{NO}_2 + \dots\dots\dots \text{H}_2\text{O}$ (1 mark)
- z. $\dots\dots\dots \text{Fe}(\text{NO}_3)_3 + \dots\dots\dots \text{NaOH} \rightarrow \dots\dots\dots \text{Fe}(\text{OH})_3 + \dots\dots\dots \text{NaNO}_3$ (1 mark)

Total for Question 2 = 26 marks

Section 3: A bit more challenging...

3. Balance the following equations. Read each carefully before you attempt to balance.

Note: feel free to do them in pencil first if you like 😊



- q. $\text{K}_4\text{Fe}(\text{CN})_6 + \dots \text{H}_2\text{SO}_4 + \dots \text{H}_2\text{O} \rightarrow \dots \text{K}_2\text{SO}_4 + \text{FeSO}_4 + \dots (\text{NH}_4)_2\text{SO}_4 + \dots \text{CO}$ (1 mark)
- r. $\dots \text{Cl}_2 + \dots \text{NaOH} \rightarrow \dots \text{NaCl} + \dots \text{NaClO}_3 + \dots \text{H}_2\text{O}$ (1 mark)
- s. $\dots \text{KMnO}_4 + \dots \text{H}_2\text{O}_2 + \dots \text{H}_2\text{SO}_4 \rightarrow \dots \text{K}_2\text{SO}_4 + \dots \text{MnSO}_4 + \dots \text{O}_2 + \dots \text{H}_2\text{O}$ (1 mark)
- t. $\dots \text{C}_7\text{H}_5\text{N}_3\text{O}_6 + \dots \text{O}_2 \rightarrow \dots \text{CO}_2 + \dots \text{H}_2\text{O} + \dots \text{N}_2$ (1 mark)
- u. $\dots \text{KMnO}_4 + \dots \text{HCl} \rightarrow \dots \text{KCl} + \dots \text{MnCl}_2 + \dots \text{H}_2\text{O} + \dots \text{Cl}_2$ (1 mark)
- v. $\dots \text{K}_2\text{Cr}_2\text{O}_7 + \dots \text{HCl} \rightarrow \dots \text{KCl} + \dots \text{CrCl}_3 + \dots \text{H}_2\text{O} + \dots \text{Cl}_2$ (1 mark)
- w. $\dots \text{I}_2 + \dots \text{Na}_2\text{S}_2\text{O}_3 \rightarrow \dots \text{NaI} + \dots \text{Na}_2\text{S}_4\text{O}_6$ (1 mark)
- x. $\dots \text{As}_2\text{O}_3 + \dots \text{KI} + \dots \text{HCl} \rightarrow \dots \text{AsI}_3 + \dots \text{KCl} + \dots \text{H}_2\text{O}$ (1 mark)
- y. $\dots \text{CuSCN} + \dots \text{KIO}_3 + \dots \text{HCl} \rightarrow \dots \text{CuSO}_4 + \dots \text{HCN} + \dots \text{KCl} + \dots \text{ICl} + \dots \text{H}_2\text{O}$ (1 mark)
- z. $\dots \text{H}_3\text{PO}_4 + \dots (\text{NH}_4)_2\text{MoO}_4 + \dots \text{HNO}_3 \rightarrow \dots (\text{NH}_4)_3\text{PO}_4 \cdot 12\text{MoO}_3 + \dots \text{NH}_4\text{NO}_3 + \dots \text{H}_2\text{O}$ (1 mark)

Total for Question 3 = 26 marks

Section 4: The ultimate challenge 😊

Have a go at this balancing equation problem... It may take you a few attempts. This is more difficult than anything you would see in the GCSE exam but let's see if you can crack it! It is possible by the way.

Proustite, also known as '**ruby silver**', is a mineral with the chemical formula Ag_3AsS_3 .

When it is heated with concentrated nitric acid (HNO_3), a complex reaction occurs where the silver, arsenic, and sulfur atoms are all oxidised.

Your challenge is to balance the monster equation that describes this reaction.



Total for Question 4 = 7 marks